

Introduction

The **LPC2294** and **LPC2214** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/256 kilobytes (kB) of embedded high speed flash memory. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty.

With their 144 pin package, low power consumption, various 32-bit timers, 8-channel 10-bit ADC, PWM channels and up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. Number of available GPIOs ranges from 76 (with external memory) through 112 pins (single-chip). With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.

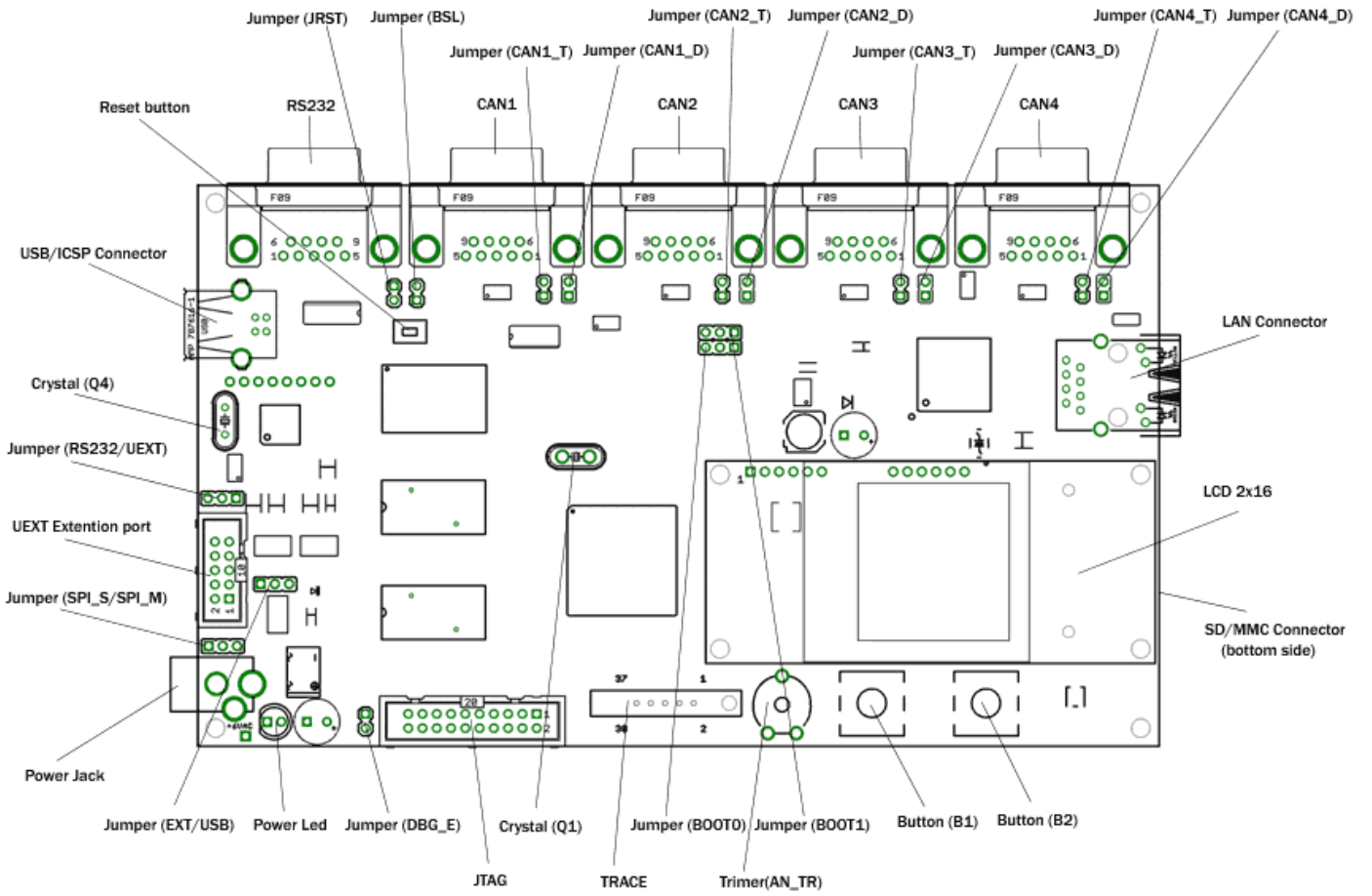
The **LPC E2214** Development board is designed to evaluate **LPC2214** processor. It has the following features:

- MCU: **LPC2214** 16/32 bit ARM7TDMI-S™t with 256K Bytes Program Flash, 16K Bytes RAM, EXTERNAL MEMORY BUS, RTC, 4x 10 bit ADC 2.44 uS, 2x UARTs, 2x 32bit TIMERS, 7x CCR, 6x PWM, WDT, 5V tolerant I/O, up to 60MHz operation
- Standard JTAG connector with ARM 2x10 pin layout for programming/debugging with ARM-JTAG
- 1MB (256Kx32bit) 8/10 ns K6R4016V1D SRAM
- 1MB (512Kx16bit) 55/70ns MX26LV800T FLASH
- USB to RS232 converter
- RESET circuit with external control of Philips ISP utility via USB-RS232 virtual port
- Jumpers for boot select from external memory
- Jumpers for ISP/RUN mode
- Ethernet controller with DM9000E and RJ45 connector
- LCD 16x2 DISPLAY with BACKLIGHT
- 2 BUTTONS
- SD/MMC connector
- POTENTIOMETER connected to AIN0
- RS232 driver and connector
- UEXT connector
- Single power supply: 6V AC or 9V DC required
- Power supply LED
- Power supply filtering capacitor
- Two on board voltage regulators 1.8V and 3.3V with up to 800mA current

The **LPC E2294** Development board is designed to evaluate **LPC2294** processor. It has the following features:

- MCU: **LPC2294** 16/32 bit ARM7TDMI-S™t with 256K Bytes Program Flash, 16K Bytes RAM, EXTERNAL MEMORY BUS, RTC, 4x 10 bit ADC 2.44 uS, 2x UARTs, 4x CAN, 2x 32bit TIMERS, 7x CCR, 6x PWM, WDT, 5V tolerant I/O, up to 60MHz operation
- Standard JTAG connector with ARM 2x10 pin layout for programming/debugging with ARM-JTAG
- 1MB (256Kx32bit) 8/10 ns K6R4016V1D SRAM
- **2MB (1Mx16bit)** 70ns TE28F160C3 C3 INTEL FLASH
- USB to RS232 converter,
- 4 CAN drivers and connectors
- RESET circuit with external control of Philips ISP utility via USB-RS232 virtual port
- Jumpers for boot select from external memory
- Jumpers for ISP/RUN mode
- Ethernet controller with DM9000E and RJ45 connector
- LCD 16x2 DISPLAY with BACKLIGHT
- 2 BUTTONS
- SD/MMC connector
- POTENTIOMETER connected to AIN0
- RS232 driver and connector
- UEXT Connector
- Single power supply: 6V AC or 9V DC required
- Power supply LED
- Power supply filtering capacitor
- Two on board voltage regulators 1.8V and 3.3V with up to 800mA current

Board LPC E22x4 (depends of MCU: LPC2214 or LPC2294)



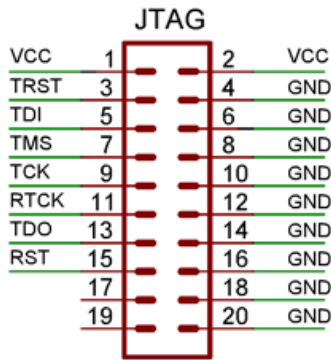
Peripherals

| Unit | Description |
|--------------------|---|
| COM Port (RS232) | RS232 DB9 Female connector for LPC2294 UART0. |
| CAN1 | CAN DB9 Male connector for LPC CAN1 Interface (LPC-E2294 only) |
| CAN2 | CAN DB9 Male connector for LPC CAN2 Interface (LPC-E2294 only) |
| CAN3 | CAN DB9 Male connector for LPC CAN3 Interface (LPC-E2294 only) |
| CAN4 | CAN DB9 Male connector for LPC CAN4 Interface (LPC-E2294 only) |
| SD/MMC connector | Connector for external SD/MMC cards. |
| LCD Display | 2X16 LCD Display |
| JTAG Connector | 2x10 0.1" step connector for JTAG programming . |
| UEXT Connector | 2x5 0.1" step connector |
| USB/ICSP connector | USB connector Type B for LPC UART0 interface. |
| LAN Connector | Ethernet controller with DM9000E and RJ45 connector |
| SRAM Memory | LPC E2214: 1MB (256Kx32bit) 12 ns K6R4016V1D SRAM connected to CS1 LPC E2294: 1MB (256Kx32bit) 12 ns K6R4016V1D SRAM connected to CS1 |
| Flash Memory | LPC E2214: 1MB (512Kx16bit) 70ns MX26LV800T connected FLASH to CS0 LPC E2294: 2MB (1Mx16bit) 70ns TE28F160C3 C3 FLASH connected to CS0 |
| Buttons | Two buttons connected to interrupt ports - P0.15 (pin 99) and P0.16 (pin 100) and Reset button |
| Leds | Power supply indicator for board (PWR). |

Technical characteristics

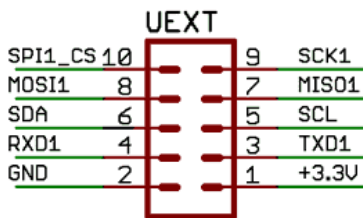
| Parameter | Description |
|-----------------------|---|
| Voltage Supply | min 9.0V DC, max 12.0V DC min 6.0V AC, max 9.0V AC or +5V from USB (depending from EXT/USB jumper) |
| CPU | LPC E2214 -> LPC2214 LPC E2294 -> LPC2294 |
| Crystals | Q1 - 14.7456 MHz HF crystal Q3 - 25 MHz Q4 - 6 MHz |
| Board dimensions | 171 x 99 mm (6.7 x 3.9 ") |
| PCB | FR-4, 1.5 mm (0,062"), green solder mask, white silkscreen component print |
| Operating Temperature | form 0°C to 70°C |

JTAG Connector



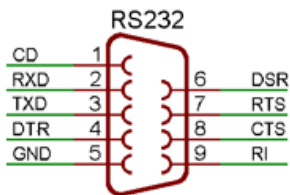
| Pin / Name | Connected to: | Functionality |
|------------|-------------------|---------------|
| 1 - VCC | VCC | - |
| 2 - VCC | VCC | - |
| 3 - TRST | PIN 43 | P1.31/TRST |
| 4 - GND | GROUND | - |
| 5 - TDI | PIN 140 | P1.28/TDI |
| 6 - GND | GROUND | - |
| 7 - TMS | PIN 113 | P1.30/TMS |
| 8 - GND | GROUND | - |
| 9 - TCK | PIN 126 | P1.29/TCK |
| 10 - GND | GROUND | - |
| 11 - RTCK | GROUND via jumper | - |
| 12 - GND | GROUND | - |
| 13 - TDO | PIN 144 | P1.27/TDO |
| 14 - GND | GROUND | - |
| 15 - RST | PIN 135 | RST |
| 16 - GND | GROUND | - |
| 17 - - | no connected | - |
| 18 - GND | GROUND | - |
| 19 - - | no connected | - |
| 20 - GND | GROUND | - |

UEXT extension



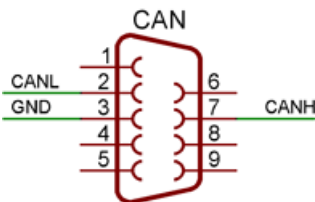
| Pin / Name | Connected to: | Functionality |
|--------------|---------------|---|
| 1 - +3.3V | +3.3V | - |
| 2 - GND | GROUND | - |
| 3 - TXD1 | PIN 75 | P0.8 / TXD1 / PWM4 |
| 4 - RXD1 | PIN 76 | P0.9 / RXD1 / PWM6 / EINT3 (via jumper) |
| 5 - SCL | PIN 50 | P0.2 / SCL / CAP 0.0 |
| 6 - SDA | PIN 58 | P0.3 / SDA / MAT0.0 / EINT1 |
| 7 - MISO1 | PIN 121 | P0.18 / CAP1.3 / MISO1 / MAT1.3 |
| 8 - MOSI1 | PIN 122 | P0.19 / MAT1.2 / MOSI1 / CAP1.2 |
| 9 - SCLK1 | PIN 101 | P0.17 / CAP1.2 / SCK1 / MAT1.2 |
| 10 - SPI1_CS | PIN 123 | P0.20 / MAT1.3 / SSEL1 / EINT3 |

RS232 Connector



| Pin / Name | Connected to: | Functionality |
|------------|---------------|---|
| 1 - CD | not connected | - |
| 2 - TXD | PIN 75 | P0.8 / TXD1 / PWM4 |
| 3 - RXD | PIN 76 | P0.9 / RXD1 / PWM6 / EINT3 (via jumper) |
| 4 - DTR | not connected | - |
| 5 - GND | GROUND | - |
| 6 - DSR | not connected | - |
| 7 - RTS | not connected | - |
| 8 - CTS | not connected | - |
| 9 - RI | not connected | - |

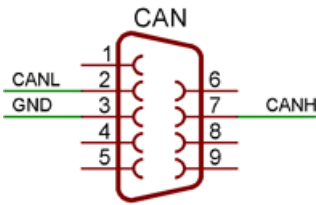
CAN Connector (CAN1)



| Pin / Name | Connected to: | Functionality |
|------------|---------------|---------------|
| 2 - CANL | CAN LOW | - |
| 3 - GND | GROUND | - |
| 7 - CANH | CAN HIGH | - |

- MCP2551 (U7) is connected to LPC CAN1 Interface (TD1 and RD1)
- CANL and CANH are connected via CAN1_T jumper

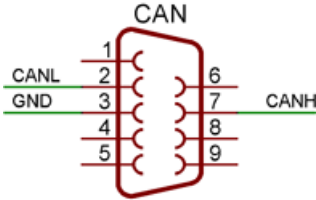
CAN Connector (CAN2)



| Pin / Name | Connected to: | Functionality |
|------------|---------------|---------------|
| 2 - CANL | CAN LOW | - |
| 3 - GND | GROUND | - |
| 7 - CANH | CAN HIGH | - |

- MCP2551 (U6) is connected to LPC CAN2 Interface (TD2 and RD2)
- CANL and CANH are connected via CAN2_T jumper

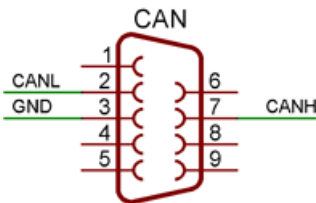
CAN Connector (CAN3)



| Pin / Name | Connected to: | Functionality |
|------------|---------------|---------------|
| 2 - CANL | CAN LOW | - |
| 3 - GND | GROUND | - |
| 7 - CANH | CAN HIGH | - |

- MCP2551 (U8) is connected to LPC CAN3 Interface (TD3 and RD3)
- CANL and CANH are connected via CAN3_T jumper

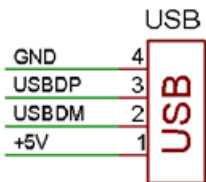
CAN Connector (CAN4)



| Pin / Name | Connected to: | Functionality |
|------------|---------------|---------------|
| 2 - CANL | CAN LOW | - |
| 3 - GND | GROUND | - |
| 7 - CANH | CAN HIGH | - |

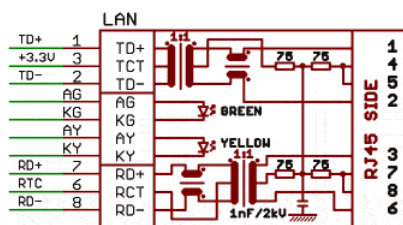
- MCP2551 (U9) is connected to LPC CAN4 Interface (TD4 and RD4)
- CANL and CANH are connected via CAN4_T jumper

USB/ICSP Connector



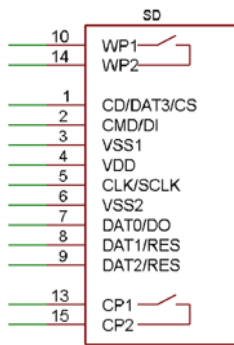
| Pin / Name | Connected to: | Functionality |
|------------|-----------------|---------------|
| 1 - +5V | +5V DC | - |
| 2 - USBDM | FT232BM (PIN 8) | USBDM |
| 3 - USBDP | FT232BM (PIN 7) | USBDP |
| 4 - GND | GROUND | - |

LAN Connector



| Pin / Name | Connected to: | Functionality |
|----------------|----------------|---|
| 1 - TD+ | DM9000E PIN 33 | TXD+ |
| 2 - TD- | DM9000E PIN 34 | TXD- |
| 3 - +3.3V | +3.3V | RXD+ |
| AG | +3.3V | - |
| KG (SPEED/DUP) | PIN60 or PIN61 | Notice: depends of smd jumper SPEED/DUP |
| AY | +3.3V | RXD- |
| KY (LINK_ACT) | PIN 62 | LINKACT |
| 6 - RTC | - | - |
| 7 - RD+ | DM9000E PIN 29 | RD+ |
| 8 - RD- | DM9000E PIN 30 | RD- |

SD/MMC Connector



| Pin / Name | Connected to: | Functionality |
|----------------|-------------------|---|
| 1 - CD/DAT3/CS | PIN 36 or PIN 123 | P3.24 / CS3 or P0.20 / MAT1.3 / SSEL1 / EINT3 |
| 2 - CMD/DI | PIN 122 | P0.19 / MAT1.2 / MOSI1 / CAP1.2 |
| 3 - VSS1 | GROUND | - |
| 4 - VDD | +3.3V | - |
| 5 - CLK/SCLK | PIN 101 | P0.17 / CAP1.2 / SCK1 / MAT1.2 |
| 6 - VSS2 | GROUND | - |
| 7 - DAT0/DO | PIN 121 | P0.18 / CAP1.3 / MISO1 / MAT1.3 |
| 8 - DAT1/RES | +3.3V | - |
| 9 - DAT2/RES | +3.3V | - |
| 10 - WP1 | PIN 70 | P1.24 / TRACECLK |
| 14 - WP2 | GROUND | - |
| 13 - CP1 | PIN 60 | P1.25 / EXTIN0 |
| 15 - CP2 | GROUND | P1.15 / HTXD |

Jumpers

| Jumpers | Position | Description |
|----------------------------------|----------|---|
| Jumper (JRST) Jumper (BSL) | | Disable ICSP programming. |
| | | Enable ICSP programming - via USB (virtual COM port) |
| Jumper (CAN1_T) | | CAN1 Terminator disable |
| | | CAN1 Terminator enable (120 ohm) |
| Jumper (CAN1_D) | | CAN1 Driver enable |
| | | CAN1 Driver disable |
| Jumper (CAN2_T) | | CAN2 Terminator disable |
| | | CAN2 Terminator enable (120 ohm) |
| Jumper (CAN2_D) | | CAN2 Driver enable |
| | | CAN2 Driver disable |
| Jumper (CAN3_T) | | CAN3 Terminator disable |
| | | CAN3 Terminator enable (120 ohm) |
| Jumper (CAN3_D) | | CAN3 Driver enable |
| | | CAN3 Driver disable |
| Jumper (CAN4_T) | | CAN4 Terminator disable |
| | | CAN4 Terminator enable (120 ohm) |
| Jumper (CAN4_D) | | CAN4 Driver enable |
| | | CAN4 Driver disable |
| Jumper (BOOT1) Jumper (BOOT0) | | Selects 8-bit memory on CS0 for boot. |
| | | Selects 16-bit memory on CS0 for boot. |
| | | Selects 32-bit memory on CS0 for boot. |
| | | Selects Internal Flash memory. |
| Jumper (RS232/UEXT) | | Port P0.9/RXD1/PWM6/EINT3 (pin 76) connected to UEXT Extension port |
| | | Port P0.9/RXD1/PWM6/EINT3 (pin 76) connected to LPC UART1 interface |
| Jumper (SPI_S/SPI_M) | | CS pin on SD/MMC connector is connected to P0.20 / MAT1.3 / SSEL1 / EINT3 (pin 123) |
| | | CS pin on SD/MMC connector is connected to P3.24 / CS3 (pin 36) |
| Jumper (EXT/USB) | | External power supply (power jack connector) |
| | | USB power supply. |
| Jumper (DBG_E) | | Disable JTAG programming. |
| | | Enable JTAG programming. |

SMD Jumper: SPEED/DUP - KG lan pin connected to DM9000E PIN 60 (#SPEED) or PIN 61(#DUP)

